

Claims 21, 23 have been rejected under 35 USC 103(a) as being unpatentable over Lischner in view of U.S. patent no. 4,561,011 ("Kohara").

Claim 22 has been rejected under 35 USC 103(a) as being unpatentable over Lischner and Kohara in view of U.S. patent no. 6,215,670 ("Khandros").

Applicants respectfully traverse these rejections because the cited references do not disclose or suggest every element of any claim, as the following analysis shows.

Claim 7 recites a substrate having top and bottom surface buildup layers disposed on a thermally conductive substrate core, with a portion of the substrate core exposed at a top surface for attachment of a heat spreader. Claims 10 and 21 are similar, but recite the heat spreader actually connected to the substrate core. No matter how the elements of Lischner are interpreted, Lischner does not disclose these limitations. Lischner discloses a substrate 120 with a first surface 125 and a second surface 126 (Fig. 1 and col. 1, lines 18-20). If all three of these elements are collectively interpreted as the substrate core, then the substrate of Lischner has no surface buildup layers. If element 120 is interpreted as the substrate core, and surfaces 125, 126 are interpreted as surface buildup layers, then there is no exposed portion of core 120 for attachment of the core to heat spreader 140, and the heat spreader attaches to the surface buildup layers rather than the core.

The remaining references were cited for limitations recited only in the dependent claims, but do not disclose or suggest those limitations in independent claims 7, 10 and 21 that are missing from Lischner.

Claim 8 depends from claim 7; claims 11-13, 15, 18-20 depend from claim 10, and claims 22-23 depend from claim 21, so these claims contain the same limitations not disclosed or suggested by the cited references.

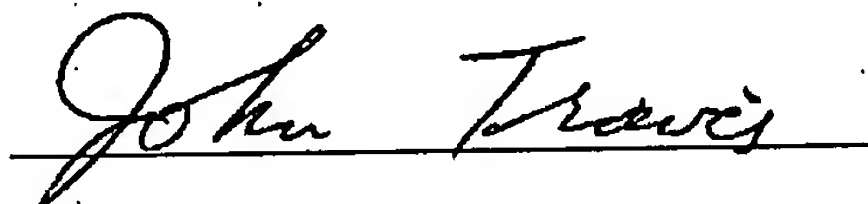
CONCLUSION

For the foregoing reasons, Applicant submits that claims 7-23 are now in condition for allowance, and indication of allowance by the Examiner is respectfully requested. If the Examiner has any questions concerning this application, he or she is requested to telephone the undersigned at the telephone number shown below as soon as possible. No fee is believed due in connection with this response. If this is incorrect, please charge any insufficiency or credit any overpayment to Deposit Account No. 02-2666.

Respectfully submitted,

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Date: 11-26-02



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**APPENDIX A**

**Marked-up version of amended claims**

7. (Amended once) An apparatus comprising:  
a package substrate having top and bottom surface buildup layers disposed on a thermally conductive substrate core, wherein a portion of the substrate core is exposed at a top surface of the package substrate [to allow] for attachment of a heat spreader.
10. An apparatus comprising:  
a package substrate having top and bottom surface buildup layers disposed on a thermally conductive substrate core;  
an integrated circuit having a top surface and a backside surface, the integrated circuit mounted on a [top] first surface of the package substrate with the top surface of the integrated circuit facing [down] the package substrate; and  
a heat spreader thermally [coupled] connected to the substrate core, a bottom surface of the heat spreader thermally coupled to the backside surface of the integrated circuit.
21. (Amended once) An apparatus comprising:  
a package substrate having top and bottom surface buildup layers disposed on a thermally conductive substrate core;

at least two integrated circuits having top surfaces and backside surfaces, the integrated circuits mounted on a first [top] surface of the package substrate with the top surfaces of the integrated circuits facing [down] the package substrate; and

a heat spreader thermally coupled to the substrate core, wherein a [bottom] surface of the heat spreader is thermally [coupled] connected to the backside surfaces of the at least two integrated circuits.